REMARKS

This responds to the Office Action mailed on <u>April 25, 2007</u>. Reconsideration is respectfully requested.

Claims 1 – 4, 6, 7, 9, 12, 17,25 – 27 and 31 - 32 are amended, and claims 8, 10 – 11, 16, 20 – 24 and 30 are canceled; as a result, claims 1 – 7, 9, 12 – 15, 17 – 19, 25 – 29 and 31 – 32 are now pending in this application.

§101 Rejection of the Claims

Claims 31 and 32 were rejected under 35 U.S.C. § 101 as being directed to non-statutory subject matter. The Office Action asserts that claims 31 and 32 are drawn to functional descriptive material and not claimed as residing on a computer readable medium. Claims 31 and 32 have been amended to recite a computer-readable medium that stores instructions for execution by one or more processors. Accordingly, claims 31 and 32 are believed to be directed to statutory subjection matter.

§112 Rejection of the Claims

Claims 1, 9, 21-22, 25, 27 and 31-32 were rejected under 35 U.S.C. § 112, first paragraph, as lacking adequate description or enablement. The amendments to the claims are believed to have overcome this rejection.

§103 Rejection of the Claims

Claims 1, 3-4, 5-6, 9-10, 16-18, 20-22, 24-25, 27 and 30-32 were rejected under 35 U.S.C. § 103(a) as being unpatentable over MacAulay Calum et al. (WO 97/43732) in view of Reiser et al. (U.S. 6,125,339) and further in view of Berliner (2002/0001402).

Applicant's claim 1, as amended, is directed to a system for identifying anomalous targets that uses *both static and non-static features* of the targets *imaged over time*. As recited in claim 1, the system includes an imaging subsystem generate a track file that comprises both the static and non-static features. As further recited in claim 1, the system also includes an image processing subsystem that extracts predetermined features from the track files to generate two or

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more feature sets for the imaged targets. Each feature set corresponds to one of the extracted features. As further recited in claim 1, the system also includes a discrimination subsystem that generates two or more probabilistic belief functions corresponding, respectively to the two or more feature sets. The discrimination subsystem generates an output by *separately weighting* the two or more belief functions associated with **both the static and non-static features** and indicates whether or not at least some of the targets are anomalous. As further recited in claim 1, the belief functions are discrete probability functions comprising probability distributions describing when the targets are likely anomalous, and the weights associated with the belief functions are updated based on actual results indicating whether or not the targets are actually anomalous. Applicant's other independent claims 25 and 31 have similar recitations.

Applicant's claims, as amended, recite that belief functions of static and non-static features are weighted and combined. Support for this can be found in Applicant's specification as a whole, and specifically to the updating of belief functions which effectively changes the belief function's weight when combined with other belief functions. The use of both static and non-static features is described through Applicant's specification.

Applicant submits that non-static features of targets (e.g., the movement and rotation of cells) along with static features (e.g., ratio of nucleus size to cell size) provides for improved anomalous detection, not taught, suggested or motivated by the combination of MacAulay and Reiser.

Applicant further submits that updating the weights (based on actual results) associated with believe functions for both static and non-static features further improves anomalous detection (e.g., by reducing false negatives) and is not taught, suggested or motivated by the combination of MacAulay and Reiser.

The use of non-static features

Applicant submits that MacAulay does not teach, suggest, or motivate the use of any non-static features to detect malignancy. MacAulay lists features that are used for each in-focus object on pages 14 – 37 (see MacAulay page 13 lines 22 – 24). MacAulay identifies features that include mean radius (page 15), run length texture feature, morphological area (page 14), inertia

shape (page 17), sphericity (page 16), compactness (page 17), centroids (page 15), eccentricity (page 16), cell orientation (page 18), elongation (page 18), boundary variation (freq ffts on page 19), etc. None of these features are dynamic features (such as rotation or movement/velocity as specifically recited in Applicant's claims 5 and 6) within the image. According to the Examiner (regarding claims 5 and 6), MacAulay discloses the use of a radial vector containing the velocity and the angle to know the rotational movement, and that the equation to calculate elongation uses the radial vector (see page 7-8 of the office action). Applicant respectfully disagrees with this interpretation of MacAulay and submits that the radius vector in MacAulay is nothing more than the length from the centroid to points along the object perimeter used to determine the cell elongation (see MacAulay page 18 lines 20 – 24). The object must be stationary in a single image to determine elongation because if the object were moving or rotating, the elongation would change. Therefore, MacAulay cannot use dynamic elements to measure this feature.

MacAulay's use of a 3D image also does not capture non-static features. MacAulay generates a 3D image by changing the focal plane by moving the microscope in the z-direction allowing different depths of the image to come into focus. This is done on a static image because if the image were moving, it would be difficult to correlate the images from each focal plane in the z-direction (see MacAulay page 3 lines 4 – 17).

MacAulay is concerned with malignity-associated changes (MACs) that occur in the nuclei of cells (see MacAulay page 1 line 22 – page 2 line 3). The changes refer to the number of cells in the sample that exhibit a MAC as compared to the number of cells that do not (see page 4, lines 7 – 12). In other words, the changes are not dynamic events that occur within different images, but differences between cells of a single image. Accordingly, Applicant finds no teaching, suggestion, or motivation in MacAulay to use non-static features.

Use of Belief Functions

According to the Examiner, the use of a predetermined threshold in MacAulay can be interpreted as a belief function (see page 5 of the office action). Applicant respectfully disagrees with this interpretation of MacAulay. Applicant's belief functions are defined in claim 1 as "discrete probability functions comprising probability distributions" describing when the targets are likely anomalous. A threshold, when exceed, as used by MacAulay, indicates that there is

certain chance that a patient will develop cancer (see MacAulay page 13 lines 2 – 9).
MacAulay's thresholds are therefore not probability distributions. Furthermore, MacAulay
applies the threshold to a determination that a patient will develop cancer. Applicant on the other
hand, generates belief functions for individual feature sets (as opposed to a threshold for all
features). In Applicant's claims, the weighting and combining of the belief functions results in an
output that indicates a probability that that the target in anomalous.

Motivation to combine MacAulay and Reiser

Applicant submits that there is no teaching, suggestion, or motivation to combine Reiser
with MacAulay. Applicant submits that the application of probabilistic belief functions to
detecting anomalous targets such as cancer cells was developed by the Applicant. As discussed
above, MacAulay does not use belief functions. Although Reiser discloses the use of belief
functions, Reiser applies the belief functions to erroneous and possibly contradictory information
sources (see Reiser abstract). Applicant finds no teaching, suggestion, or motivation in Reiser to
apply belief functions to the detection of anomalous targets, such as cancer cells. A suggestion to
combine must come from within the prior art and not from Applicant's specification of
impermissible hindsight (see In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991);
MPEP 2143. The Examiner must avoid hindsight reconstruction. In re Bond, 910 F.2d 831, 834,
15 USPQ2d 1566, 1568 (Fed. Cir. 1990)).

In view of the above, Applicant submits that there is no teaching, suggestion or
motivation to combine MacAulay and Reiser, and that if MacAulay and Reiser were combined,
that the combination does not result in applicant's claimed invention.

In summary:

1) MacAulay only use discloses the use of static features to detect malignancy;

2) MacAulay does not use belief functions;

3) MacAulay does not weight and combine belief functions associated with static and
non-static features;

4) MacAulay does not update the belief functions based on actual results; and

5) There is no teaching, suggestion or motivation in Reiser of MacAulay that belief functions can be applied to features of target so detect anomalous targets.

Accordingly, claims 1, 25, and 31 are believed to be in condition for allowance. The dependent claims are also believed to be allowable at least because of their dependency on either claim 1, 25, or 31.

Claims 2 and 26 were rejected under 35 USC § 103(a) as being unpatentable over MacAulay Calum et al. in view of Reiser et al., and further in view of Berliner and further in view of Logorrhea-Sanchez (U.S. 3,675,768). Claims 2 and 26 are believed to be allowable at least because of their dependency on one of claims 1, 25, or 31.

Claim 7 was rejected under 35 USC § 103(a) as being unpatentable over MacAulay Calum et al. in view of Reiser et al., and further in view of Berliner and further in view of Maurer et al. (U.S. 2001/003375). Claim 7 is believed to be allowable at least because of its dependency on claim 1.

Claims 8, 15 and 19 were rejected under 35 USC § 103(a) as being unpatentable over MacAulay Calum et al. in view of Reiser et al., and further in view of Berliner and further in view of Roth (U.S. 2003/0041053). Claims 15 and 19 are believed to be allowable at least because of their dependency on claim 1.

Claims 11 and 23 were rejected under 35 USC § 103(a) as being unpatentable over MacAulay Calum et al. in view of Reiser et al., and further in view of Berliner and further in view of Wang (U.S. 2001/0051004). Claims 11 and 23 have been cancelled.

Claims 12-14 and 28-29 were rejected under 35 USC § 103(a) as being unpatentable over MacAulay Calum et al. in view of Reiser et al., and further in view of Wang, Berliner, and Lee (U.S. 2003/0072470). Claims 12-14 and 28-29 are believed to be allowable at least because of their dependency on claim 1 or claim 25.

Claims 28-29 were rejected under 35 USC § 103(a) as being unpatentable over MacAulay Calum et al. in view of Reiser et al., and further in view of Berliner and further in view of Lee. Claims 28-29 are believed to be allowable at least because of their dependency on claim 25.

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Reservation of Rights

In the interest of clarity and brevity, Applicant may not have addressed every assertion made in the Office Action. Applicant's silence regarding any such assertion does not constitute any admission or acquiescence. Applicant reserves all rights not exercised in connection with this response, such as the right to challenge or rebut any tacit or explicit characterization of any reference or of any of the present claims, the right to challenge or rebut any asserted factual or legal basis of any of the rejections, the right to swear behind any cited reference such as provided under 37 C.F.R. § 1.131 or otherwise, or the right to assert co-ownership of any cited reference. Applicant does not admit that any of the cited references or any other references of record are relevant to the present claims, or that they constitute prior art. To the extent that any rejection or assertion is based upon the Examiner's personal knowledge, rather than any objective evidence of record as manifested by a cited prior art reference, Applicant timely objects to such reliance on Official Notice, and reserves all rights to request that the Examiner provide a reference or affidavit in support of such assertion, as required by MPEP § 2144.03. Applicant reserves all rights to pursue any cancelled claims in a subsequent patent application claiming the benefit of priority of the present patent application, and to request rejoinder of any withdrawn claim, as required by MPEP § 821.04.

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CONCLUSION

Applicant respectfully submits that the claims are in condition for allowance and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicant's attorney (480) 659-3314 to facilitate prosecution of this application.

If necessary, please charge any additional fees or credit overpayment to Deposit Account No. 19-0743.
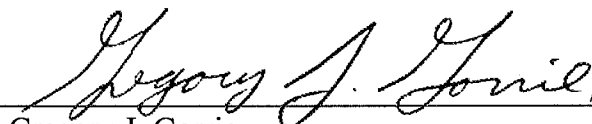
Respectfully submitted,

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CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being filed using the USPTO's electronic filing system EFS-Web, and is addressed to: Commissioner of Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on this 3rd day of August 2007.

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